Banks' Capital Structure and US dollar Diversification of Assets: Does Reduction in Systemic Risk Offset Agency Costs?

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ABSTRACT:

Multinational Corporation (MNCs) should gain advantage from international diversification by lowering their systemic risk and reducing their bankruptcy cost. Hence, internationalization should induce larger leverage. However, it may imply additional agency costs due to wider informal gaps and higher cost of investigation induced by the multiplication of markets. To examine how currency diversification of asset may change the bank's systemic risk, we provide a theoretical framework based on relative CAPM by introducing explicitly the exchange rate risk. Due to exchange rate dynamics asset diversification may reduce systemic risk even through the two assets are perfectly correlated.
Using innovative micro data on credit institutions located in France between 1999 and 2014 we expand our analysis to the net effect of US dollar diversification of assets. Contrary to past studies, this measure of financial internationalization take into consideration the exchange rate risk. Although our results highlight the two opposite effects of diversification, they posit the importance of international agency costs in the capital structure decision.

JEL classification: F3, F4, G15

Keywords: bank, capital structure, leverage, currency, diversification, internationalization.

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1 Introduction

The last financial crisis has highlighted the international implication of European global banks in the US financial markets. Following Borio and Disyatat [2011], Baba et al. [2009], McGuire and Von Peter [2012], European banks were largely involved in US money markets by using their local subsidiaries as sources of funding. Considering this international development, European banks are supposed to have a currency diversification of both their assets and their liabilities. Focusing on credit institutions located in France, we observe a large increase of euro denomination between 1999 and 2008 mainly due to the euro area enlargement. However, currency diversification measuring by the share of assets or liabilities in foreign currency includes a significant part of the banks' balance sheet between 1999 and 2014 with an average of 0.23 over the period.

In addition to the well known determinants of the capital structure,[2] internationalization induces an enlarge framework of activities which might change the capital structure decision. As posited by Burgman [1996], Shapiro [2013], the Multinational Corporation (MNCs) should gain advantage from a diversification by lowering their risks. MNCs should observe lower volatility of earnings and hence lower probability of bankruptcy. Following the trade-off theory from Kraus and Litzenberger [1973], the decline in bankruptcy cost would induce larger leverage. However, internationalization also implies additional agency costs such as wider informal gaps and higher cost of investigation due to the multiplication of markets.

Although Fatami [1984], Shaked [1986] find that MNCs have a lower systemic risk than Domestic Corporations (DCs), a significant part of the empirical literature [Burgman [1996], Reeb et al. [1998], Kwok and Reeb [2000]] concludes to a negative relationship

[2]Frank and Goyal [2008] provide a review of the literature of good quality including trade-off and pecking theories

between MNCs' internationalization and MNCs' leverage. These conclusions suggest the domination of agency costs in the net effect of internationalization.

Past empirical studies including Burgman [1996], Chen et al. [1997], Griffin and Karolyi [1998], Singh and Nejadmalayeri [2004], Akhtar [2005] proxy international diversification dimension by focusing on the foreign sales ratio. Supposing that having external activities does not necessarily imply different currencies, these analyses do not take into account the potential exchange rate channel. Including currency diversification would take into consideration this dimension.

Thus, the purpose of this paper is to investigate the effect of total asset's US dollar diversification on capital structure. We use innovative micro data on credit institutions located in French between 1999 and 2014. Accessing to this kind of data gives us all information on the currency breakdown of each bank's balance sheet.

This paper implies two main contributions. First, it provides a theoretical framework which completes works from Reeb et al. [1998], Kwok and Reeb [2000] by introducing the exchange rate risk in the definition of the systemic risk. As our interest is on the global capital decision of banks, our focus is on consolidated leverage. It implies a conversion of foreign asset in domestic currency. By introducing the conversion of asset in foreign currency, the definition of systemic risk through the Capital Asset Pricing Model (CAPM) specifies the effect of exchange rate in systemic risks. Second, it fills the gap in the current empirical literature which does not include currency diversification in the determinants of the leverage. To our knowledge this paper is the first attempt to link empirically currency diversification with capital structure decision at a micro level.

Our results suggest a negative relationship between US dollar diversification of as-

sets and leverage especially for investment banks. By focusing on diversification relative resident counterpart, our results highlight the importance of agency costs and the two opposite effects of currency diversification. Interestingly, the crisis may increase the net effect of diversification. Finally, the introduction of banks fixed effects confirm conclusions from Lemmon et al. [2008] even though diversification stay negative and significant.

The remainder of the paper is organized as follows. Section 2 develops theoretical framework based on the CAPM. Section 3 describes the data set and provides details on the sample selection. Section 4 explain our empirical approach. Finally, empirical results are given in section 5.

2 Theoretical Framework

2.1 Definition of Assets and Exchange rate:

Note C the domestic asset. Returns of domestic assets are expressed through Stochastic Differential Equation (SDE) such as:

$$\frac{dC}{C} = r_C dt + \sigma_C dZ_C \tag{1}$$

$$\frac{\mathrm{E}\left(dC/C\right)}{dt} = r_C \qquad \frac{\mathrm{Var}\left(dC/C\right)}{dt} = \sigma_C^2 \tag{2}$$

Where $dZ_C \sim (0, dt)$.

Note $C^\star$ the foreign asset in foreign currency and S the exchange rate such that $C^\star S$ is the total foreign asset in domestic currency. Using SDE, we can define the following

components such as:

$$\frac{dC^\star}{C^\star} = r_{C^\star}dt + \sigma_{C^\star}dZ_{C^\star} \tag{3}$$

$$\frac{\mathrm{E}\left(dC^\star/C^\star\right)}{dt} = r_{C^\star} \qquad \frac{\mathrm{Var}\left(dC^\star/C^\star\right)}{dt} = \sigma^2_{C^\star} \tag{4}$$

$$\frac{dS}{S} = \mu dt + \sigma_S dZ_S \tag{5}$$

$$\frac{\mathrm{E}\left(dS/S\right)}{dt} = \mu \qquad \frac{\mathrm{Var}\left(dS/S\right)}{dt} = \sigma^2_S \tag{6}$$

$$\frac{dC^\star S}{C^\star S} = (r_{C^\star} + \mu)dt + \sigma_{C^\star}dZ_{C^\star} + \sigma_S dZ_S \tag{7}$$

$$\frac{\mathrm{E}\left(dC^\star S/C^\star S\right)}{dt} = r_{C^\star} + \mu \qquad \frac{\mathrm{Var}\left(dC^\star S/C^\star S\right)}{dt} = \sigma^2_{C^\star} + \sigma^2_S + 2Cov_{S,C^\star} \tag{8}$$

Where $dZ_{C^\star} \sim (0, dt)$ and $dZ_S \sim (0, dt)$.

2.2 CAPM:

Following Shapiro [2013], a more diversified institution would have less correlated returns with the market and its systemic risk may decrease. To examine how asset diversification may change the systemic risk of the bank, we develop the relative Capital Asset Pricing Model (CAPM) to the domestic asset. It consists of a risk-free interest rate $r_{f,t}$ plus a risk premium function of a systemic risk $\beta_{C,C^\star}$ and a market risk $(r_{C,t} - r_{f,t})$ such as:

$$r_{i,t} = r_{f,t} + \beta_{C,C^\star S}(r_{C,t} - r_{f,t}) \tag{9}$$

Where:

$r_{i,t}$ = equilibrium expected return for the foreign project i relative to the domestic

$r_{f,t}$ = rate of return on a risk-free asset

$\beta_{C,C^\star S}$ = the foreign asset beta when measured relative to the domestic asset

r_C = the expected return on the domestic asset

$\beta_{C,C^\star S}$ is the systemic risk of the foreign asset relative to the domestic asset. It is a function of standard deviations and of the correlation between the two assets $\rho_{(C,C^\star S)}$ such as:

$$\frac{\beta_{C,C^\star S}}{dt} = \frac{\rho_{(C,C^\star S)} \cdot \sigma_{C^\star S}}{\sigma_C} \tag{10}$$

In order to introduce the exchange rate risk in our analysis, we compare the domestic asset with the foreign asset converted in domestic currency. If $\beta_{C^\star S}$ is less than one, then the foreign project which consist of investing in foreign asset in foreign currency implies lower risk. Following the literature on capital structure and internationalization, it should imply higher leverage.

The correlation between the two assets $\rho_{(C,C^\star S)}$ can be developed such as:

$$\frac{\rho_{(C,C^\star S)}}{dt} = \frac{Cov_{C,C^\star S}}{\sigma_C \ \sigma_{C^\star S}} \tag{11}$$

$$= \frac{\mathrm{E}\left(\frac{dC}{C} \ \frac{dC^\star S}{C^\star S}\right) - \mathrm{E}\left(\frac{dC}{C}\right)\mathrm{E}\left(\frac{dC^\star S}{C^\star S}\right)}{\sigma_C \ \sigma_{C^\star S}} \tag{12}$$

$$= \frac{Cov_{CC^\star} + Cov_{CS}}{\sigma_C \ \sigma_{C^\star S}} \tag{13}$$

$$= \frac{\rho_{CC^\star} \ \sigma_{C^\star} + \rho_{CS} \ \sigma_S}{\sigma_{C^\star S}} \tag{14}$$

Where $\rho_{CC^\star}$ and ρ_{CS} are respectively the correlation between the two assets and the correlation between the domestic asset and the exchange rate. Thus, the beta of the

foreign asset relative to the domestic one becomes:

$$\frac{\beta_{C,C^\star S}}{dt} = \rho_{CC^\star} \frac{\sigma_{C^\star}}{\sigma_C} + \rho_{CS} \tag{15}$$

If $\sigma_C = \sigma_{C^\star}$ and if $\rho_{CC^\star} = 1$, then a negative correlation between the domestic asset and the exchange rate ρ_{CS} implies a beta lower than 1. Under these conditions, asset diversification is beneficial. If $\sigma_C = \sigma_{C^\star}$ but $0 < \rho_{CC^\star} < 1$, then the correlation between the domestic asset and the exchange rate can be positive but it should be lower than $1 - \rho_{CC^\star}$ to be beneficial.

If $\sigma_C < \sigma_{C^\star}$ and if $\rho_{CC^\star} = 1$, diversification is not beneficial. However, a negative correlation between the domestic asset and the exchange rate ρ_{CS} would mitigate the increasing volatility. If $\rho_{CC^\star} < 1$, the diversification can still be beneficial if $\rho_{CS} < 1 - \rho_{CC^\star} \frac{\sigma_{C^\star}}{\sigma_C}$.

No surprisingly, if $\sigma_C > \sigma_{C^\star}$ then diversification is beneficial even with a positive correlation ρ_{CS} such that $\rho_{CS} < 1 - \frac{\sigma_{C^\star}}{\sigma_C}$.

As diversified banks should face lower risks, these banks would face lower expected bankruptcy costs. Therefore they have a higher capacity to carry debt in Modigliani and Merton [1963] a world.

However, diversification may also induce agency costs such as the covering of foreign financial markets and exchange rate or facing additional information asymmetry. Hence in a future version of this paper we may want to develop a trade-off model to supplement our analysis .

3 Data set and sample selection

Our sample consists of french and foreign credit institutions located in France. Data are collected by the french banking supervision authority known as the ACPR. Data are on a yearly basis from 1999 to 2014 included. Because of bankruptcies, sample selection and merger acquisitions, our panel is unbalanced.

We implement two sample selections to built sub-samples. First, we keep credit institutions which have a minimum of 5 years occurrence over the period. It brings more stability on our sample. Second, we identify investment banks by following the methodology of Baglioni et al. [2013] except that we focus on the type of liabilities the bank uses. Contrary to the United States, banks in France can make both operations under the same entity. There is no distinction between commercial and investment banks. However, the nature of banking activities may change capital structure decision as posited by Gropp and Heider [2010], Kalemli-Ozcan et al. [2011]. In this paper, a credit institution is thus identified as an investment bank if its average ratio of deposit to total debt is lower than the median value of the total sample over the period.

The final data set brings together two types of data. First, we focus on classical accounting data such as total asset, collateral, equity and net income. Those data can be collected at a different level of consolidation depending on the credit institution. For large and international institutions, data are consolidated using the IFRS accounting standards. Smaller parent institutions provide consolidated data and use french accounting standards (FRGAAP). Finally, stand-alone institutions provide unconsolidated data. With years, consolidated data becomes more and more dominant. In 2014, all the data are consolidated. As the three different levels of consolidation may imply different rules and definitions of the balance sheet components, we control for it in our

analysis.

The second type of data includes foreign currency exposures which breakdown credits and debt securities. These exposures are unconsolidated. As our interest is on the global analysis of banking groups, we need to build a proxy of consolidated diversification. The solution we choose consists in adding up currency exposures of all affiliates in the same banking group. Thereby, currency diversification of a banking group is measured through a ratio of total amount denominated in a given currency relative to the total amount in all currencies.

This measure may have two issues. First, there is a risk of a double counting because of intra-group flows. However, as long as diversification is a ratio, the double counting issue appears in both the numerator and the denominator. It mitigates the risk. Second, unconsolidated data do not include exposures of affiliates abroad. Thus, this measure of currency diversification might underestimate the true degree of diversification of a banking group.

An alternative of this measure of currency diversification consists in keeping the exposures of the head of the group only. However, this alternative shows really thin differences with our measure, except for cooperative banking groups. As cooperative banking groups are more decentralized, we believe that our measure better captures the overall currency diversification of these groups.

4 Empirical analysis

4.1 Model:

We follow Gropp and Heider [2010] approach where all variables are in level and the explanatory variables are lagged. Two main theories feed this approach, the trade-off theory from Kraus and Litzenberger [1973] and the pecking order theory from Myers and Majluf [1984]. All together, they identify four main determinants of the leverage.

The trad-off theory suggests that $Size$ affects positively the leverage. Larger institutions benefit from an implicit protection against bankruptcy because of their too big to fail position. There is less risk for creditors and the cost of raising debt decreases. Banks have thereby an incentive to increase their leverage.

Regarding profitability captured by the variable $Profit$, the trade-off theory predicts that higher profitability decreases the cost of raising debt because of the good signal sent to creditors. Thus, the relationship should be positive. On the contrary, the pecking-order theory suggests a negative relationship. Institutions with large profits would prefer to use this resource instead of new to debt or additional equity. In fact issuing new debt or increasing equity is quite costly for the bank.

According to the trade-off theory, the collateral measured by the variable $Collateral$ gives a guarantee for the creditors of the institution. Considering that more collateral reduces the cost of debt, banks should have higher leverage.

Following the literature on multinational companies and internationalization[3], internationalization induces two potential and opposite effects. In one hand, it allows MNCs

[3]Burgman [1996], Chen et al. [1997], Griffin and Karolyi [1998], Akhtar [2005]

to diversify their risks and the bankruptcy costs. On the other hand it implies additional agency costs which might offset internationalization benefits.

Assuming that US dollar diversification also concerns bank's collateral, collateral should be diversified regarding risks and it should offer a better guarantee for creditors. US dollar diversification may thereby increase the role played by collateral in the determination of leverage. In the other hand, US dollar diversification induces extra monitoring costs. These two effects are captured by the interaction term between the collateral ratio and US dollar diversification with the coefficient β_5. As it includes opposite effects, the expected sign of β_5 capture the net effect of currency diversification. We introduce Divers with β_4 as a control variable.

The final specification is of the form:

$$\begin{aligned} Leverage_{i,t} = \alpha + \beta_1\, Size_{i,t-1} + \beta_2\, Profit_{i,t-1} + \beta_3\, Collateral_{i,t-1} + \beta_4\, Divers_{i,t-1} \\ + \beta_5\, (Collateral_{i,t-1} \text{ x } Divers_{i,t-1}) + \delta\, Controls + \gamma FE_{time} + u_{i,t} \end{aligned} \tag{CAP}$$

We introduced three control variables in $Controls$ in addition to $Diver$. First, we define a ratio of total off-balance to total asset $Off\ BS$. This variable would control for hedging strategy. Second, we use a dummy $Conso$ which is equal to 1 if the data are consolidated. Finally, we introduce another dummy $IFRS$ which is equal to 1 if credit institutions are under the IFRS accounting standards. These two dummies control for the different sources we have explained in section 3.

4.2 Empirical findings:

4.2.1 Exchange rate and domestic asset:

Our theoretical framework posits that under the assumption of a negative correlation between the domestic asset and the exchange rate (defined as the number of domestic units per unit of foreign currency), currency diversification should reduce systemic risk. Figure 1 graph the euro dollar exchange rate with the CAC 40 index. In this graph, an increase in the euro dollar exchange rate translates an appreciation of the euro.[4] Between

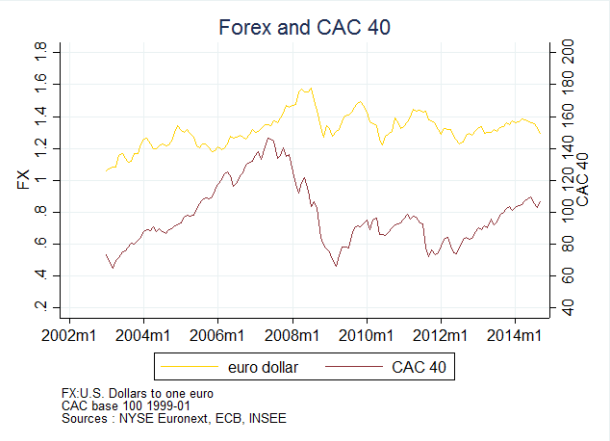

Figure 1: Domestic asset and exchange rate

2003 and September 2014 the correlation between the CAC 40 and the exchange rate was equal to 0.3 and it was significant at 1%. There is a positive correlation between the potential domestic asset and the value of the domestic currency. This descriptive statistic supports our theoretical conclusions where an improvement of the domestic asset is associated with an appreciation of the domestic currency. The next sections develop the empirical findings regarding the capital structure decision.

[4] In our theoretical framework S is defined as the number of domestic units per unit of foreign currency. An decrease of S translates an appreciation of the domestic currency.

4.2.2 A global vision from 1999 to 2014:

Regarding the three main determinants identified by the literature - known as size, profitability and collateral - our results in table 3 confirm both theories depending on the variable. Size is positive and significant for all specifications thereby confirming the trade-off theory. The largest institutions benefit from an implicit protection which reduces their cost of raising debt. Thus, larger institutions tend to have higher leverage. The profitability is negative and significant for almost all samples. These results confirm the pecking order theory where banks prefer to use their profit instead of raising new debt. The collateral ratio is positive and significant for all samples thereby supporting the trade-off theory. Considering that collateral offers a protection for the creditors, banks benefit from lower cost of debt which leads to higher leverage. Moreover, coefficients increase when we focus on all investment banks and investment banks with at least five years occurrence.

Our main variable of interest - the interaction term between the collateral ratio and the US dollar diversification - should tell us whether US dollar diversification reduces the role played by collateral in the determination of leverage. The coefficient of this interaction term is negative for all specifications and significant for the two samples focusing on investment banks. It suggests that benefits from credit risk diversification is dominated by additional agency cost.

Going further, table 4 reports regressions when the US dollar diversification of asset only concerns domestic counterparty. Divers_RES isolates the agency costs of diversification by excluding main advantages from asset diversification. With large and mainly significant coefficients on the interaction term, our results suggest that US dollar diversification of asset relative to domestic counterparty reduces the role played by collateral in the determination of leverage. Comparing with previous results in table 3, it supports

the idea that US dollar diversification includes two opposite effects which are relevant for the capital structure.

Finally, we introduce the mismatch position dummy in table 5. It does not change our previous conclusion and the coefficient of the mismatch position are not significant.

4.2.3 A two periods decomposition:

Capital structure decision theory is linked to the creditors' perception of banks stability and performance. The subprime crisis followed by the euro area debt crisis may have affected it for different reasons. First, the implicit guarantee of the "Too big to fail" has been questioned with large banks bankruptcy. Second, risk was undervalued before the crisis which plays an important role in the risk premium and the cost of debt. An adjustment has been observed since then. It might increase the role of profit as a source of funding. Third, the notion of collateral and the way banks raise funds has changed in the euro area since the beginning of the crisis. On one hand, the safety of government bonds has been questioned with the euro area debt crisis. On the other hand, the ECB has enlarged the definition of eligible collateral and proposed new facilities which changes the usual sources of funding. Finally, the cost of US dollar debt has largely increased especially in 2011. Theferore two sub-periods decomposition allows us to see whether the relationship is symmetric or not.

For all these reasons, table 6 decomposes the complete period of 1999-2014 into two sub-periods from 1999 to 2007 and from 2008 to 2014 for the pre-crisis and the post-crisis period respectively. There is no complete reversal of the situation for the usual variables used in the capital structure decision.

Regarding our main variable of interest, our results suggest that the post-crisis period is more relevant to capture the role played by US dollar diversification. Compared to the global period or the pre-crisis sub-period, coefficients relative to the interaction term are larger. Uncertainty and euro-dollar exchange rate volatility have increased in the post-crisis period thereby extending agency costs.

4.2.4 Introducing banks Fixed-Effects:

As we might want to identify leverage determinants within banks, we introduce in table 7 banks Fixed-Effects. Profitability and the collateral ratio are not significant anymore which suggests that heterogeneity comes from cross section for those variables. As highlighted by Lemmon et al. [2008], capital structures is mainly determined by stable factors that do not change over time. Our descriptive statistics in previous section illustrate it.

Our main variable of interest - the interaction term between collateral and US dollar diversification - is not significant anymore while the the diversification taking apart is negative and significant for all samples.

5 Conclusion

International diversification should imply a decline in systemic risk which decreases the cost of bankruptcy. Therefore, banks with larger currency diversification of assets should have higher leverage. However, financial internationalization my also imply additional agency costs including wider informal gaps and higher cost of investigation due to the multiplication of markets.

Following the CAPM specification, diversification should reduce systemic risk if assets are not perfectly correlated. Through an adaptation of the CAPM, we show that due

to exchange rate dynamics asset diversification may reduce systemic risk even through the two assets are perfectly correlated. However, our current model does not include potential agency costs.

Our empirical results support past studies which posit a negative relationship between internationalization and leverage. Focusing on resident counterpart of assets, our analysis highlights the importance of international agency costs in the capital structure decision. Moreover, it shows the presence of a total net effect which combine the advantage of diversification and the additional cost.

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6 Appendix

.1 Variable definitions

Table 1: Variable definitions

Main variables:	
$Leverage$	$\frac{Asset}{Equity}$
$Size$	$ln(Asset)$
$Profit.$	$\frac{Net\ income}{Asset}$
$Collateral$	$\frac{Collateral}{Asset}$
$Divers$	$\frac{Asset\ denominated\ in\ USD}{TotalAsset}$
$Divers\_RES$	$\frac{Asset\ denominated\ in\ USD\ with\ resident\ conterparty}{TotalAsset}$
$Invest.$	=1 if $\left(\frac{Deposit}{Total\ Debt}\right)_i < \left(\frac{Deposit}{Total\ Debt}\right)_{median(i...N)}$
$Mismatch$	=1 if $Asset\ in\ foreign\ currency\ >\ Liability\ in\ foreign\ currency$
Controls:	
FR	=1 if banks are french
Dep. Ratio	="low" if the bank's deposit ratio deposit/debt is in the left hand side of the distribution (the first 25%) ; ="medium low" if its ratio is in between the 25% and the 50% ; ="medium high" if its ratio is in between the 50% and the 75% ; and ="high" if its ratio is in the last 25% of the right side of the distribution.
$Sub\ Cat.$	Breakdown credit institutions between banks, cooperative banking groups and other
$Conso$	=1 if data are consolidated
$IFRS$	=1 if banks report data using IFRS standards
$Off\ BS$	$\frac{Off-balance\ sheet}{Asset}$

.2 Correlation

Table 2: Variance co-variance matrix (1999-2014)

	Leverage	*Size*	*Profit*	*Collateral*	*Diver.*	*Diver_RES*	*Invest.*	*Mismatch*
Leverage	1							
	529							
Size	0.4931*	1						
	0							
	529	529						
Profit	-0.3287*	-0.1815*	1					
	0	0						
	529	529	529					
Collateral	0.1891*	0.1693*	0.1261*	1				
	0	0.0001	0.0037					
	529	529	529	529				
Divers	-0.0982*	-0.3498*	-0.1066*	-0.2289*	1			
	0.0239	0	0.0142	0				
	529	529	529	529	529			
Divers_RES	-0.0951*	-0.2868*	-0.0019	-0.1683*	0.6160*	1		
	0.0288	0	0.9646	0.0001	0			
	529	529	529	529	529	529		
Invest.	-0.1247*	-0.2790*	0.043	-0.2245*	0.2840*	0.2394*	1	
	0.0041	0	0.3234	0	0	0		
	529	529	529	529	529	529	529	
Mismatch	-0.1864*	-0.1974*	0.0811	-0.1130*	0.0728	0.0317	-0.0322	1
	0	0	0.0623	0.0093	0.0942	0.4673	0.4601	
	529	529	529	529	529	529	529	529

.3 Empirical results

Table 3: Leverage determinant and US dollar diversification

Dependent variable : $Leverage_t$				
	(1)	(2)	(3)	(2+3)
$Size_{t-1}$	3.15***	3.31***	3.66***	3.47***
	(0.40)	(0.42)	(0.79)	(0.84)
$Profit_{t-1}$	-86.72**	-72.93*	-89.84	-185.86*
	(35.35)	(39.86)	(68.90)	(95.24)
$Collateral_{t-1}$	15.07*	16.96*	27.06***	29.02***
	(8.37)	(8.59)	(8.84)	(8.77)
$Divers_{t-1}$	1.02	1.18	-4.88	-3.83
	(3.70)	(4.03)	(8.01)	(9.28)
$Collateral$ x $Divers_{t-1}$	-45.59	-52.93	-77.82*	-90.23**
	(42.64)	(44.96)	(39.10)	(35.86)
$Conso_{t-1}$	-0.93	-1.69	-2.01	-2.01
	(2.70)	(2.85)	(6.13)	(6.44)
$Off\ BS_{t-1}$	0.30	0.86	2.33	2.56*
	(1.62)	(1.67)	(1.49)	(1.47)
$IFRS_{t-1}$	1.82	1.44	-0.73	0.76
	(2.69)	(2.90)	(3.37)	(3.54)
$Constant$	-11.37***	-11.74**	-16.69***	-16.61***
	(3.96)	(4.76)	(3.69)	(3.29)
Adjusted R^2	0.50	0.55	0.62	0.65
N	412	367	210	191

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Four samples are studied: (1) is the unconstrained sample with all banks ; (2) includes banks with a minimum of 5 years occurrence over the period ; (3) focuses on investment banks ; (2+3) is for investment banks with a minimum of 5 years occurrence. Standard errors are clustered. LSDV include sub-category of banks, Dep. Ratio and banks' nationality. Time Fixed-Effects included.

Table 4: Leverage determinant, US dollar diversification and pure valuation effect

Dependent variable : $Leverage_t$				
	(1)	(2)	(3)	(2+3)
$Size_{t-1}$	2.22***	2.18***	3.38***	3.16***
	(0.39)	(0.41)	(0.74)	(0.76)
$Profit_{t-1}$	-124.48**	-123.26**	-74.84	-143.29
	(47.08)	(54.27)	(62.29)	(88.60)
$Collateral_{t-1}$	16.35*	17.55* *	25.11**	26.61**
	(8.77)	(9.21)	(9.86)	(10.29)
$Divers\_RES_{t-1}$	6.89	6.41	7.37	21.16
	(5.58)	(5.81)	(28.20)	(29.64)
$Collateral$x$Divers_RES_{t-1}$	-123.33*	-123.33	-251.83**	-302.56**
	(73.45)	(76.70)	(123.24)	(136.96)
$Conso_{t-1}$	-0.62	-0.02	0.84	1.24
	(2.69)	(2.85)	(5.84)	(5.96)
$Off\ BS_{t-1}$	-1.05	-0.66	2.64	2.81
	(1.63)	(1.76)	(1.84)	(1.95)
$IFRS_{t-1}$	-0.68	-0.88	0.82	2.59
	(2.99)	(3.16)	(3.47)	(3.57)
$Constant$	-8.09**	-7.96*	-17.95***	-18.22***
	(3.45)	(4.36)	(4.35)	(4.37)
Adjusted R^2	0.39	0.41	0.60	0.61
N	412	367	210	191

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Four samples are studied: (1) is the unconstrained sample with all banks ; (2) includes banks with a minimum of 5 years occurrence over the period ; (3) focuses on investment banks ; (2+3) is for investment banks with a minimum of 5 years occurrence. Standard errors are clustered. LSDV include sub-category of banks, Dep. Ratio and banks' nationality. US dollar diversification focuses on US dollar diversification with resident counterparty only. Time Fixed-Effects included.

Table 5: Leverage determinant, US dollar diversification and mismatch position

Dependent variable : $Leverage_t$				
	(1)	(2)	(3)	(2+3)
$Size_{t-1}$	3.14***	3.38***	3.53***	3.38***
	(0.38)	(0.38)	(0.73)	(0.78)
$Profit_{t-1}$	-86.55**	-72.19*	-90.89	-188.18*
	(35.64)	(38.65)	(70.60)	(98.56)
$Collateral_{t-1}$	14.97*	17.49**	26.35***	28.58***
	(8.17)	(8.26)	(8.62)	(8.49)
$Divers_{t-1}$	1.00	1.50	-4.82	-3.92
	(3.68)	(3.95)	(7.99)	(9.37)
$Collateral$ x $Divers_{t-1}$	-45.27	-54.73	-75.31**	-88.60**
	(41.72)	(43.39)	(37.05)	(33.46)
$Mismatch_{t-1}$	-0.24	0.91	-1.26	-0.74
	(1.33)	(1.40)	(1.42)	(1.46)
$Conso_{t-1}$	-0.95	-1.60	-1.85	-1.91
	(2.75)	(2.90)	(6.13)	(6.40)
$Off\ BS_{t-1}$	0.30	0.83	2.25	2.50*
	(1.62)	(1.71)	(1.47)	(1.44)
$IFRS_{t-1}$	1.84	1.34	-0.50	0.89
	(2.69)	(2.85)	(3.30)	(3.51)
$Constant$	-11.15***	-12.74***	-17.03***	-13.74***
	(4.01)	(4.69)	(3.35)	(3.88)
Adjusted R^2	0.50	0.55	0.62	0.64
N	412	367	210	191

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Four samples are studied: (1) is the unconstrained sample with all banks ; (2) includes banks with a minimum of 5 years occurrence over the period ; (3) focuses on investment banks ; (2+3) is for investment banks with a minimum of 5 years occurrence. Standard errors are clustered. LSDV include sub-category of banks, Dep. Ratio and banks' nationality. Time Fixed-Effects included.

Table 6: Leverage determinant, US dollar diversification and crisis decomposition

Dependent variable : $Leverage_t$

	(1)	(2)	(3)	(2+3)
$Size_{t-1}$	3.15***	3.43***	3.43***	3.21***
	(0.39)	(0.43)	(0.84)	(0.95)
Post-crisis x $Size_{t-1}$	2.96***	3.09***	4.11***	4.04***
	(0.67)	(0.70)	(0.79)	(0.76)
$Profit_{t-1}$	-82.28**	-67.33*	-74.83	-208.55
	(35.24)	(36.67)	(72.74)	(123.63)
Post-crisis x $Profit_{t-1}$	-100.19*	-90.46	-265.33	-236.47
	(50.39)	(60.62)	(190.16)	(193.93)
$Collateral_{t-1}$	21.30**	24.28**	30.39***	34.19***
	(9.27)	(9.57)	(9.89)	(9.64)
Post-crisis x $Collateral_{t-1}$	1.60	1.59	23.63***	22.99***
	(9.86)	(10.79)	(8.10)	(8.08)
$Divers_{t-1}$	1.12	3.73	-5.93	-0.28
	(3.85)	(3.97)	(11.00)	(15.92)
Post-crisis x $Divers_{t-1}$	0.34	-7.39	1.67	2.54
	(8.40)	(8.21)	(11.23)	(11.77)
Collateral x $Divers_{t-1}$	-58.78	-69.09	-70.60	-93.45**
	(41.30)	(43.14)	(42.21)	(41.18)
Post-crisis(*Collateral* x $Divers_{t-1}$)	-21.77	-13.84	-183.74**	-178.80**
	(77.37)	(82.05)	(67.99)	(69.46)
Post-crisis dummy	0.19	4.30	-3.89	-7.59
	(6.47)	(7.63)	(9.19)	(10.40)
Constant	-7.58**	-10.61**	-15.26**	-11.20*
	(3.76)	(3.98)	(6.30)	(5.99)
Adjusted R^2	0.51	0.56	0.63	0.66
N	412	367	210	191

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Four samples are studied: (1) is the unconstrained sample with all banks ; (2) includes banks with a minimum of 5 years occurrence over the period ; (3) focuses on investment banks ; (2+3) is for investment banks with a minimum of 5 years occurrence. Standard errors are clustered. LSDV include sub-category of banks, Dep. Ratio and banks' nationality. We decompose each coefficient relative to two sub-periods: the pre-crisis period from 1999 to 2007 and the post-crisis period from 2008 to 2014. Not all control variables shown. Time Fixed-Effects included.

Table 7: Leverage determinant and US dollar diversification: introduncing banks' Fixed Effect

Dependent variable : $Leverage_t$				
	(1)	(2)	(3)	(2+3)
$Size_{t-1}$	8.08***	8.40***	9.21***	9.79***
	(2.29)	(2.38)	(2.46)	(2.51)
$Profit_{t-1}$	-28.16	-23.89	49.37	81.84
	(17.13)	(20.25)	(101.07)	(98.55)
$Collateral_{t-1}$	7.08	8.12	18.10	20.15
	(5.11)	(5.69)	(12.13)	(12.90)
$Divers_{t-1}$	-10.92*	-10.76*	-15.86**	-14.12*
	(5.74)	(6.00)	(7.10)	(7.12)
$Collateral$ x $Divers_{t-1}$	-14.45	-17.30	-50.24	-59.73
	(25.11)	(26.65)	(36.65)	(38.49)
$Conso_{t-1}$	-8.07**	-8.11**	-5.19**	-5.05**
	(3.43)	(3.41)	(2.07)	(2.05)
$Off\ BS_{t-1}$	-0.93	-0.69	-1.00	-0.61
	(2.16)	(2.23)	(2.31)	(2.34)
$IFRS_{t-1}$	0.57	0.16	1.95	0.66
	(2.38)	(2.46)	(2.35)	(2.26)
$Constant$	-48.03**	-51.69**	-69.71***	-76.08***
	(19.10)	(20.62)	(25.30)	(25.68)
Within R^2	0.27	0.28	0.32	0.33
N	412	367	209	196

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Four samples are studied: (1) is the unconstrained sample with all banks ; (2) includes banks with a minimum of 5 years occurrence over the period ; (3) focuses on investment banks ; (2+3) is for investment banks with a minimum of 5 years occurrence. Standard errors are clustered. Time Fixed-Effects included.